

# SEQUENCE LISTING

<110> Das Gupta, Tapas K.  
Chakrabarty, Ananda  
Punj, Vasu  
Zaborina, Olga  
Hiraoka, Yoshinori  
Yamada, Tohru

<120> CYTOTOXIC FACTORS FOR MODULATING CELL DEATH

<130> 11472-11

<150> U.S. Provisional Application Attorney Ref. No. 11462/5

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<160> 53

<170> PatentIn version 3.1

<210> 1

<211> 128

<212> PRT

<213> Pseudomonas aeruginosa

<400> 1

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Thr	Asn	Ala	Ile	Thr	Val	Asp	Lys	Ser	Cys	Lys	Gln	Phe	Thr	Val	Asn
			20					25					30		

Leu	Ser	His	Pro	Gly	Asn	Leu	Pro	Lys	Asn	Val	Met	Gly	His	Asn	Trp
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Val	Leu	Ser	Thr	Ala	Ala	Asp	Met	Gln	Gly	Val	Val	Thr	Asp	Gly	Met
	50					55					60				

Ala	Ser	Gly	Leu	Asp	Lys	Asp	Tyr	Leu	Lys	Pro	Asp	Asp	Ser	Arg	Val
65					70					75					80

Ile	Ala	His	Thr	Lys	Leu	Ile	Gly	Ser	Gly	Glu	Lys	Asp	Ser	Val	Thr
				85					90					95	

Phe Asp Val Ser Lys Leu Lys Glu Gly Glu Gln Tyr Met Phe Phe Cys  
100 105 110

Thr Phe Pro Gly His Ser Ala Leu Met Lys Gly Thr Leu Thr Leu Lys  
115 120 125

<210> 2  
<211> 105  
<212> PRT  
<213> Phormidium laminosum

<400> 2

Glu Thr Phe Thr Val Lys Met Gly Ala Asp Ser Gly Leu Leu Gln Phe  
1 5 10 15

Glu Pro Ala Asn Val Thr Val His Pro Gly Asp Thr Val Lys Trp Val  
20 25 30

Asn Asn Lys Leu Pro Pro His Asn Ile Leu Phe Asp Asp Lys Gln Val  
35 40 45

Pro Gly Ala Ser Lys Glu Leu Ala Asp Lys Leu Ser His Ser Gln Leu  
50 55 60

Met Phe Ser Pro Gly Glu Ser Tyr Glu Ile Thr Phe Ser Ser Asp Phe  
65 70 75 80

Pro Ala Gly Thr Tyr Thr Tyr Tyr Cys Ala Pro His Arg Gly Ala Gly  
85 90 95

Met Val Gly Lys Ile Thr Val Glu Gly  
100 105

<210> 3  
<211> 155  
<212> PRT  
<213> Thiobacillus ferrooxidans

<400> 3

Gly Thr Leu Asp Thr Thr Trp Lys Glu Ala Thr Leu Pro Gln Val Lys  
1 5 10 15

Ala Met Leu Glu Lys Asp Thr Gly Lys Val Ser Gly Asp Thr Val Thr  
20 25 30

Tyr Ser Gly Lys Thr Val His Val Val Ala Ala Ala Val Leu Pro Gly  
35 40 45

Phe Pro Phe Pro Ser Phe Glu Val His Asp Lys Lys Asn Pro Thr Leu  
50 55 60

Glu Ile Pro Ala Gly Ala Thr Val Asp Val Thr Phe Ile Asn Thr Asn  
65 70 75 80

Lys Gly Phe Gly His Ser Phe Asp Ile Thr Lys Lys Gly Pro Pro Tyr  
85 90 95

Ala Val Met Pro Val Ile Asp Pro Ile Val Ala Gly Thr Gly Phe Ser  
100 105 110

Pro Val Pro Lys Asp Gly Lys Phe Gly Tyr Thr Asp Phe Thr Trp His  
115 120 125

Pro Thr Ala Gly Thr Tyr Tyr Tyr Val Cys Gln Ile Pro Gly His Ala  
130 135 140

Ala Thr Gly Met Phe Gly Lys Ile Val Val Lys  
145 150 155

<210> 4  
<211> 124  
<212> PRT  
<213> Achromobacter cycloclastes

<400> 4

Ala Asp Phe Glu Val His Met Leu Asn Lys Gly Lys Asp Gly Ala Met  
1 5 10 15

Val Phe Glu Pro Ala Ser Leu Lys Val Ala Pro Gly Asp Thr Val Thr  
20 25 30

Phe Ile Pro Thr Asp Lys Gly His Asn Val Glu Thr Ile Lys Gly Met  
35 40 45

Ile Pro Asp Gly Ala Glu Ala Phe Lys Ser Lys Ile Asn Glu Asn Tyr  
50 55 60

Lys Val Thr Phe Thr Ala Pro Gly Val Tyr Gly Val Lys Cys Thr Pro  
65 70 75 80

His Tyr Gly Met Gly Met Val Gly Val Val Gln Val Gly Asp Ala Pro  
85 90 95

Ala Asn Leu Glu Ala Val Lys Gly Ala Lys Asn Pro Lys Lys Ala Gln  
100 105 110

Glu Arg Leu Asp Ala Ala Leu Ala Ala Leu Gly Asn  
115 120

<210> 5  
<211> 82  
<212> PRT  
<213> Pseudomonas aeruginosa

<400> 5

Glu Asp Pro Glu Val Leu Phe Lys Asn Lys Gly Cys Val Ala Cys His  
1 5 10 15

Ala Ile Asp Thr Lys Met Val Gly Pro Ala Tyr Lys Asp Val Ala Ala  
20 25 30

Lys Phe Ala Gly Gln Ala Gly Ala Glu Ala Glu Leu Ala Gln Arg Ile  
35 40 45

Lys Asn Gly Ser Gln Gly Val Trp Gly Pro Ile Pro Met Pro Pro Asn  
50 55 60

Ala Val Ser Asp Asp Glu Ala Gln Thr Leu Ala Lys Trp Val Leu Ser  
65 70 75 80

Gln Lys

<210> 6  
<211> 128  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> C112D azurin mutant

<400> 6

Ala Glu Cys Ser Val Asp Ile Gln Gly Asn Asp Gln Met Gln Phe Asn  
1 5 10 15

Thr Asn Ala Ile Thr Val Asp Lys Ser Cys Lys Gln Phe Thr Val Asn  
20 25 30

Leu Ser His Pro Gly Asn Leu Pro Lys Asn Val Met Gly His Asn Trp  
35 40 45

Val Leu Ser Thr Ala Ala Asp Met Gln Gly Val Val Thr Asp Gly Met  
50 55 60

Ala Ser Gly Leu Asp Lys Asp Tyr Leu Lys Pro Asp Asp Ser Arg Val  
65 70 75 80

Ile Ala His Thr Lys Leu Ile Gly Ser Gly Glu Lys Asp Ser Val Thr  
85 90 95

Phe Asp Val Ser Lys Leu Lys Glu Gly Glu Gln Tyr Met Phe Phe Asp  
100 105 110

Thr Phe Pro Gly His Ser Ala Leu Met Lys Gly Thr Leu Thr Leu Lys  
115 120 125

<210> 7  
<211> 128  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> M44KM64E azurin mutant

<400> 7

Ala Glu Cys Ser Val Asp Ile Gln Gly Asn Asp Gln Met Gln Phe Asn  
1 5 10 15

Thr Asn Ala Ile Thr Val Asp Lys Ser Cys Lys Gln Phe Thr Val Asn  
20 25 30

Leu Ser His Pro Gly Asn Leu Pro Lys Asn Val Lys Gly His Asn Trp  
35 40 45

Val Leu Ser Thr Ala Ala Asp Met Gln Gly Val Val Thr Asp Gly Glu  
50 55 60

Ala Ser Gly Leu Asp Lys Asp Tyr Leu Lys Pro Asp Asp Ser Arg Val  
65 70 75 80

Ile Ala His Thr Lys Leu Ile Gly Ser Gly Glu Lys Asp Ser Val Thr  
85 90 95

Phe Asp Val Ser Lys Leu Lys Glu Gly Glu Gln Tyr Met Phe Phe Cys  
100 105 110

Thr Phe Pro Gly His Ser Ala Leu Met Lys Gly Thr Leu Thr Leu Lys  
115 120 125

<210> 8  
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<220>  
<223> Primer

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gcccaagctt acctaggagg ctgctccatg cta 33

<210> 9  
<211> 34  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> Primer

<400> 9  
tgagcccctg caggcgccca tgaaaaagcc cggc 34

<210> 10  
<211> 33  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> Ofoligonucleotide for C112D mutation

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cagtacatgt tcttcgacac cttcccgggc cac 33

<210> 11  
<211> 33  
<212> DNA  
<213> Artificial Sequence

<220>  
 <223> Ofoligonucleotide for C112D mutation  
  
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 <210> 12  
 <211> 32  
 <212> DNA  
 <213> Artificial Sequence  
  
 <220>  
 <223> Ofoligonucleotide for M44K mutation  
  
 <400> 12  
 cctgccgaag aacgtcaagg gccacaactg gg 32  
  
 <210> 13  
 <211> 32  
 <212> DNA  
 <213> Artificial Sequence  
  
 <220>  
 <223> Ofoligonucleotide for M44K mutation  
  
 <400> 13  
 cccagttgtg gcccttgacg ttcttcggca gg 32  
  
 <210> 14  
 <211> 29  
 <212> DNA  
 <213> Artificial Sequence  
  
 <220>  
 <223> Ofoligonucleotide for M64E mutation  
  
 <400> 14  
 ggtcaccgac ggcgaggctt ccggcctgg 29  
  
 <210> 15  
 <211> 29  
 <212> DNA  
 <213> Artificial Sequence  
  
 <220>  
 <223> Ofoligonucleotide for M64E mutation  
  
 <400> 15  
 ccaggccgga agcctcgccg tcggtgacc 29

<210> 16  
<211> 6  
<212> PRT  
<213> Artificial Sequence  
  
<220>  
<223> Antigenic epitope, EP1  
  
<400> 16

Ile Thr Val Asp Lys Ser  
1 5

<210> 17  
<211> 6  
<212> PRT  
<213> Artificial Sequence  
  
<220>  
<223> Antigenic epitope, EP2  
  
<400> 17

Val Leu Ser Thr Ala Ala  
1 5

<210> 18  
<211> 4  
<212> PRT  
<213> Artificial Sequence  
  
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<223> Antigenic Epitope, EP3  
  
<400> 18.

Gly Val Val Thr  
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<210> 19  
<211> 5  
<212> PRT  
<213> Artificial Sequence  
  
<220>  
<223> Antigenic epitope, EP4  
  
<400> 19

Gly Met Ala Ser Gly  
1 5

<210> 20



<211> 5  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Antigenic epitope, EP5

<400> 20

Arg Val Ile Ala His  
1 5

<210> 21  
<211> 4  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Antigenic epitope, EP6

<400> 21

Lys Leu Ile Gly  
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<210> 22  
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<212> PRT  
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<220>  
<223> Antigenic epitope, EP7

<400> 22

Met Lys Gly Thr Leu Thr  
1 5

<210> 23  
<211> 128  
<212> PRT  
<213> Pseudomonas aeruginosa

<400> 23

Ala Glu Cys Ser Val Asp Ile Gln Gly Asn Asp Gln Met Gln Phe Asn  
1 5 10 15

Thr Asn Ala Ile Thr Val Asp Lys Ser Cys Lys Gln Phe Thr Val Asn  
20 25 30

Leu Ser His Pro Gly Asn Leu Pro Lys Asn Val Met Gly His Asn Trp

35

40

45

Val Leu Ser Thr Ala Ala Asp Met Gln Gly Val Val Thr Asp Gly Met  
50 55 60

Ala Ser Gly Leu Asp Lys Asp Tyr Leu Lys Pro Asp Asp Ser Arg Val  
65 70 75 80

Ile Ala His Thr Lys Leu Ile Gly Ser Gly Glu Lys Asp Ser Val Thr  
85 90 95

Phe Asp Val Ser Lys Leu Lys Glu Gly Glu Gln Tyr Met Phe Phe Cys  
100 105 110

Thr Phe Pro Gly His Ser Ala Leu Met Lys Gly Thr Leu Thr Leu Lys  
115 120 125

<210> 24

<211> 128

<212> PRT

<213> *Alcaligenes faecalis*

<400> 24

Ala Cys Asp Val Ser Ile Glu Gly Asn Asp Ser Met Gln Phe Asn Thr  
1 5 10 15

Lys Ser Ile Val Val Asp Lys Thr Cys Lys Glu Phe Thr Ile Asn Leu  
20 25 30

Lys His Thr Gly Lys Leu Pro Lys Ala Ala Met Gly His Asn Val Val  
35 40 45

Val Ser Lys Lys Ser Asp Glu Ser Ala Val Ala Thr Asp Gly Met Lys  
50 55 60

Ala Gly Leu Asn Asn Asp Tyr Val Lys Ala Gly Asp Glu Arg Val Ile  
65 70 75 80

Ala His Thr Ser Val Ile Gly Gly Gly Glu Thr Asp Ser Val Thr Phe  
85 90 95

Asp Val Ser Lys Leu Lys Glu Gly Glu Asp Tyr Ala Phe Phe Cys Ser  
100 105 110

Phe Pro Gly His Trp Ser Ile Met Lys Gly Thr Ile Glu Leu Gly Ser  
115 120 125

<210> 25

<211> 129

<212> PRT

<213> *Achromobacter xylosoxidans* ssp. *denitrificans*

<400> 25

Ala Gln Cys Glu Ala Thr Ile Glu Ser Asn Asp Ala Met Gln Tyr Asn  
1 5 10 15

Leu Lys Glu Met Val Val Asp Lys Ser Cys Lys Gln Phe Thr Val His  
20 25 30

Leu Lys His Val Gly Lys Met Ala Lys Val Ala Met Gly His Asn Trp  
35 40 45

Val Leu Thr Lys Glu Ala Asp Lys Gln Gly Val Ala Thr Asp Gly Met  
50 55 60

Asn Ala Gly Leu Ala Gln Asp Tyr Val Lys Ala Gly Asp Thr Arg Val  
65 70 75 80

Ile Ala His Thr Lys Val Ile Gly Gly Gly Glu Ser Asp Ser Val Thr  
85 90 95

Phe Asp Val Ser Lys Leu Thr Pro Gly Glu Ala Tyr Ala Tyr Phe Cys  
100 105 110

Ser Phe Pro Gly His Trp Ala Met Met Lys Gly Thr Leu Lys Leu Ser  
115 120 125

Asn

<210> 26

<211> 129

<212> PRT

<213> *Bordetella bronchiseptica*

<400> 26

Ala Glu Cys Ser Val Asp Ile Ala Gly Thr Asp Gln Met Gln Phe Asp  
1 5 10 15

Lys Lys Ala Ile Glu Val Ser Lys Ser Cys Lys Gln Phe Thr Val Asn  
20 25 30

Leu Lys His Thr Gly Lys Leu Pro Arg Asn Val Met Gly His Asn Trp  
35 40 45

Val Leu Thr Lys Thr Ala Asp Met Gln Ala Val Glu Lys Asp Gly Ile  
50 55 60

Ala Ala Gly Leu Asp Asn Gln Tyr Leu Lys Ala Gly Asp Thr Arg Val  
65 70 75 80

Leu Ala His Thr Lys Val Leu Gly Gly Gly Glu Ser Asp Ser Val Thr  
85 90 95

Phe Asp Val Ala Lys Leu Ala Ala Gly Asp Asp Tyr Thr Phe Phe Cys  
100 105 110

Ser Phe Pro Gly His Gly Ala Leu Met Lys Gly Thr Leu Lys Leu Val  
115 120 125

Asp

<210> 27  
<211> 129  
<212> PRT  
<213> Methylomonas sp. J

<400> 27

Ala Ser Cys Glu Thr Thr Val Thr Ser Gly Asp Thr Met Thr Tyr Ser  
1 5 10 15

Thr Arg Ser Ile Ser Val Pro Ala Ser Cys Ala Glu Phe Thr Val Asn  
20 25 30

Phe Glu His Lys Gly His Met Pro Lys Thr Gly Met Gly His Asn Trp  
35 40 45

Val Leu Ala Lys Ser Ala Asp Val Gly Asp Val Ala Lys Glu Gly Ala  
50 55 60

His Ala Gly Ala Asp Asn Asn Phe Val Thr Pro Gly Asp Lys Arg Val  
65 70 75 80

Ile Ala Phe Thr Pro Ile Ile Gly Gly Gly Glu Lys Thr Ser Val Lys  
85 90 95

Phe Lys Val Ser Ala Leu Ser Lys Asp Glu Ala Tyr Thr Tyr Phe Cys  
100 105 110

Ser Tyr Pro Gly His Phe Ser Met Met Arg Gly Thr Leu Lys Leu Glu  
115 120 125

Glu

<210> 28  
<211> 166  
<212> PRT  
<213> Neisseria meningitidis

<400> 28

Cys Ser Gln Glu Pro Ala Ala Pro Ala Ala Glu Ala Thr Pro Ala Ala  
1 5 10 15

Glu Ala Pro Ala Ser Glu Ala Pro Ala Ala Glu Ala Ala Pro Ala Asp  
20 25 30

Ala Ala Glu Ala Pro Ala Ala Gly Asn Cys Ala Ala Thr Val Glu Ser  
35 40 45

Asn Asp Asn Met Gln Phe Asn Thr Lys Asp Ile Gln Val Ser Lys Ala  
50 55 60

Cys Lys Glu Phe Thr Ile Thr Leu Lys His Thr Gly Thr Gln Pro Lys  
65 70 75 80

Thr Ser Met Gly His Asn Ile Val Ile Gly Lys Thr Glu Asp Met Asp  
85 90 95

Gly Ile Phe Lys Asp Gly Val Gly Ala Ala Asp Thr Asp Tyr Val Lys  
100 105 110

Pro Asp Asp Ala Arg Val Val Ala His Thr Lys Leu Ile Gly Gly Gly  
115 120 125

Glu Glu Ser Ser Leu Thr Leu Asp Pro Ala Lys Leu Ala Asp Gly Glu  
130 135 140

Tyr Lys Phe Ala Cys Thr Phe Pro Gly His Gly Ala Leu Met Asn Gly  
145 150 155 160

Lys Val Thr Leu Val Asp  
165

<210> 29  
<211> 128  
<212> PRT  
<213> Pseudomonas fluorescens

<400> 29

Ala Glu Cys Lys Thr Thr Ile Asp Ser Thr Asp Gln Met Ser Phe Asn  
1 5 10 15

Thr Lys Ala Ile Glu Ile Asp Lys Ala Cys Lys Thr Phe Thr Val Glu  
20 25 30

Leu Thr His Ser Gly Ser Leu Pro Lys Asn Val Met Gly His Asn Leu  
35 40 45

Val Ile Ser Lys Gln Ala Asp Met Gln Pro Ile Ala Thr Asp Gly Leu  
50 55 60

Ser Ala Gly Ile Asp Lys Asn Tyr Leu Lys Glu Gly Asp Thr Arg Val  
65 70 75 80

Ile Ala His Thr Lys Val Ile Gly Ala Gly Glu Lys Asp Ser Leu Thr  
85 90 95

Ile Asp Val Ser Lys Leu Asn Ala Ala Glu Lys Tyr Gly Phe Phe Cys  
100 105 110

Ser Phe Pro Gly His Ile Ser Met Met Lys Gly Thr Val Thr Leu Lys  
115 120 125

<210> 30  
<211> 128  
<212> PRT  
<213> Pseudomonas chlororaphis

<400> 30

Ala Glu Cys Lys Val Asp Val Asp Ser Thr Asp Gln Met Ser Phe Asn  
1 5 10 15

Thr Lys Glu Ile Thr Ile Asp Lys Ser Cys Lys Thr Phe Thr Val Asn  
20 25 30

Leu Thr His Ser Gly Ser Leu Pro Lys Asn Val Met Gly His Asn Trp  
35 40 45

Val Leu Ser Lys Ser Ala Asp Met Ala Gly Ile Ala Thr Asp Gly Met  
50 55 60

Ala Ala Gly Ile Asp Lys Asp Tyr Leu Lys Pro Gly Asp Ser Arg Val  
65 70 75 80

Ile Ala His Thr Lys Ile Ile Gly Ser Gly Glu Lys Asp Ser Val Thr  
85 90 95

Phe Asp Val Ser Lys Leu Thr Ala Gly Glu Ser Tyr Glu Phe Phe Cys  
100 105 110

Ser Phe Pro Gly His Asn Ser Met Met Lys Gly Ala Val Val Leu Lys  
115 120 125

<210> 31

<211> 129

<212> PRT

<213> Xylella fastidiosa 9a5c

<400> 31

Lys Thr Cys Ala Val Thr Ile Ser Ala Asn Asp Gln Met Lys Phe Asp  
1 5 10 15

Gln Asn Thr Ile Lys Ile Ala Ala Glu Cys Thr His Val Asn Leu Thr  
20 25 30

Leu Thr His Thr Gly Lys Lys Ser Ala Arg Val Met Gly His Asn Trp  
35 40 45

Val Leu Thr Lys Thr Thr Asp Met Gln Ala Val Ala Leu Ala Gly Leu  
50 55 60

His Ala Thr Leu Ala Asp Asn Tyr Val Pro Lys Ala Asp Pro Arg Val  
65 70 75 80

Ile Ala His Thr Ala Ile Ile Gly Gly Gly Glu Arg Thr Ser Ile Thr  
85 90 95

Phe Pro Thr Asn Thr Leu Ser Lys Asn Val Ser Tyr Thr Phe Phe Cys  
100 105 110

Ser Phe Pro Gly His Trp Ala Leu Met Lys Gly Thr Leu Asn Phe Gly  
115 120 125

Gly

<210> 32  
<211> 38  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> Oligonucleotide for T21Q mutation within EP1

<400> 32  
caacaccaat gccatccagg tcgacaagag ctgcaagc 38

<210> 33  
<211> 38  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> Oligonucleotide for T21Q mutation within EP1

<400> 33  
agctcttgtc gacctggatg gcattggtgt tgaactgc 38

<210> 34  
<211> 31  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> Oligonucleotide for T126K mutation within EP7

<400> 34  
gaagggcacc ctgaagctga agtgatgcgc g 31



<210> 35  
 <211> 33  
 <212> DNA  
 <213> Artificial Sequence  
  
 <220>  
 <223> Oligonucleotide for T126K mutation within EP7  
  
 <400> 35  
 gcgcatact tcagcttcag ggtgcccttc atc 33

<210> 36  
 <211> 36  
 <212> DNA  
 <213> Artificial sequence  
  
 <220>  
 <223> Oligonucleotide for T52K/A53S mutations within EP2  
  
 <400> 36  
 aactgggtac tgagcaagtc cgccgacatg cagggc 36

<210> 37  
 <211> 36  
 <212> DNA  
 <213> Artificial Sequence  
  
 <220>  
 <223> Oligonucleotide for T52K/A53S mutations within EP2  
  
 <400> 37  
 ctgcatgtcg gcggacttgc tcagtaccca gttgtg 36

<210> 38  
 <211> 37  
 <212> DNA  
 <213> Artificial Sequence  
  
 <220>  
 <223> Oligonucleotide for G58P/V591 mutations within EP3  
  
 <400> 38  
 ccgccgacat gcagcccatg gtcaccgacg gcatggc 37

<210> 39  
 <211> 37  
 <212> DNA  
 <213> Artificial Sequence  
  
 <220>  
 <223> Oligonucleotide for G58P/V591 mutations within EP3  
  
 <400> 39

gccatgccgt cggtgaccat gggctgcatg tcggcgg 37

<210> 40  
<211> 30  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> Oligonucleotide for M591/V60A mutations within EP3

<400> 40  
catgcagccc atcgccaccg acggcatggc 30

<210> 41  
<211> 31  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> Oligonucleotide for M591/V60A mutations within EP3

<400> 41  
catgccgtcg gtggcgatgg gctgcatgtc g 31

<210> 42  
<211> 104  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> Oligonucleotide for S66A/G67A/H83F/K85P/L861 mutations within EP4  
, EP5, and EP6

<400> 42  
gtcaccgacg gcatggctgc cgccctggac aaggattacc tgaagcccga cgacagccgt 60  
gtcatgcct tcaccgatac atcggctcgg gcgagaagga ctcg 104

<210> 43  
<211> 105  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> Oligonucleotide for S66A/G67A/H83F/K85P/L861 mutations within EP4  
, EP5, and EP6

<400> 43  
gtcaccgagt ccttctcgcc cgagccgatg atcggggtga aggcgatgac acggctgtcg 60  
tcgggcttca ggtaatcctt gtccagggcg gcagccatgc cgctcg 105

<210> 44  
<211> 128  
<212> PRT  
<213>, *Pseudomonas aeruginosa*

<400> 44

Ala Glu Cys Ser Val Asp Ile Gln Gly Asn Asp Gln Met Gln Phe Asn  
1 5 10 15

Thr Asn Ala Ile Thr Val Asp Lys Ser Cys Lys Gln Phe Thr Val Asn  
20 25 30

Leu Ser His Pro Gly Asn Leu Pro Lys Asn Val Met Gly His Asn Trp  
35 40 45

Val Leu Ser Thr Ala Ala Asp Met Gln Gly Val Val Thr Asp Gly Met  
50 55 60

Ala Ser Gly Leu Asp Lys Asp Tyr Leu Lys Pro Asp Asp Ser Arg Val  
65 70 75 80

Ile Ala His Thr Lys Leu Ile Gly Ser Gly Glu Lys Asp Ser Val Thr  
85 90 95

Phe Asp Val Ser Lys Leu Lys Glu Gly Glu Gln Tyr Met Phe Phe Cys  
100 105 110

Thr Phe Pro Gly His Ser Ala Leu Met Lys Gly Thr Leu Thr Leu Lys  
115 120 125

<210> 45  
<211> 128  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> chimeric azurin mutant S1

<400> 45

Ala Glu Cys Ser Val Asp Ile Gln Gly Asn Asp Gln Met Gln Phe Asn  
1 5 10 15

Thr Asn Ala Ile Gln Val Asp Lys Ser Cys Lys Gln Phe Thr Val Asn  
20 25 30

Leu Ser His Pro Gly Asn Leu Pro Lys Asn Val Met Gly His Asn Trp  
35 40 45

Val Leu Ser Thr Ala Ala Asp Met Gln Gly Val Val Thr Asp Gly Met  
50 55 60

Ala Ser Gly Leu Asp Lys Asp Tyr Leu Lys Pro Asp Asp Ser Arg Val  
65 70 75 80

Ile Ala His Thr Lys Leu Ile Gly Ser Gly Glu Lys Asp Ser Val Thr  
85 90 95

Phe Asp Val Ser Lys Leu Lys Glu Gly Glu Gln Tyr Met Phe Phe Cys  
100 105 110

Thr Phe Pro Gly His Ser Ala Leu Met Lys Gly Thr Leu Thr Leu Lys  
115 120 125

<210> 46  
<211> 128  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> chimeric azurin mutant S2

<400> 46

Ala Glu Cys Ser Val Asp Ile Gln Gly Asn Asp Gln Met Gln Phe Asn  
1 5 10 15

Thr Asn Ala Ile Gln Val Asp Lys Ser Cys Lys Gln Phe Thr Val Asn  
20 25 30

Leu Ser His Pro Gly Asn Leu Pro Lys Asn Val Met Gly His Asn Trp  
35 40 45

Val Leu Ser Thr Ala Ala Asp Met Gln Gly Val Val Thr Asp Gly Met  
50 55 60

Ala Ser Gly Leu Asp Lys Asp Tyr Leu Lys Pro Asp Asp Ser Arg Val  
65 70 75 80

Ile Ala His Thr Lys Leu Ile Gly Ser Gly Glu Lys Asp Ser Val Thr  
85 90 95

Phe Asp Val Ser Lys Leu Lys Glu Gly Glu Gln Tyr Met Phe Phe Cys  
100 105 110

Thr Phe Pro Gly His Ser Ala Leu Met Lys Gly Thr Leu Lys Leu Lys  
115 120 125

<210> 47  
<211> 128  
<212> PRT  
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<220>  
<223> chimeric azurin mutant S3

<400> 47

Ala Glu Cys Ser Val Asp Ile Gln Gly Asn Asp Gln Met Gln Phe Asn  
1 5 10 15

Thr Asn Ala Ile Gln Val Asp Lys Ser Cys Lys Gln Phe Thr Val Asn  
20 25 30

Leu Ser His Pro Gly Asn Leu Pro Lys Asn Val Met Gly His Asn Trp  
35 40 45

Val Leu Ser Lys Ser Ala Asp Met Gln Gly Val Val Thr Asp Gly Met  
50 55 60

Ala Ser Gly Leu Asp Lys Asp Tyr Leu Lys Pro Asp Asp Ser Arg Val  
65 70 75 80

Ile Ala His Thr Lys Leu Ile Gly Ser Gly Glu Lys Asp Ser Val Thr  
85 90 95

Phe Asp Val Ser Lys Leu Lys Glu Gly Glu Gln Tyr Met Phe Phe Cys  
100 105 110

Thr Phe Pro Gly His Ser Ala Leu Met Lys Gly Thr Leu Lys Leu Lys  
115 120 125

<210> 48  
<211> 128  
<212> PRT  
<213> Artificial Sequence

<220>

<223> chimeric azurin mutant S3S5

<400> 48

Ala	Glu	Cys	Ser	Val	Asp	Ile	Gln	Gly	Asn	Asp	Gln	Met	Gln	Phe	Asn
1				5					10					15	

Thr	Asn	Ala	Ile	Gln	Val	Asp	Lys	Ser	Cys	Lys	Gln	Phe	Thr	Val	Asn
			20					25					30		

Leu	Ser	His	Pro	Gly	Asn	Leu	Pro	Lys	Asn	Val	Met	Gly	His	Asn	Trp
		35					40					45			

Val	Leu	Ser	Lys	Ser	Ala	Asp	Met	Gln	Gly	Val	Ala	Thr	Asp	Gly	Met
	50					55						60			

Ala	Ala	Ala	Leu	Asp	Lys	Asp	Tyr	Leu	Lys	Pro	Asp	Asp	Ser	Arg	Val
65					70					75					80

Ile	Ala	Phe	Thr	Pro	Ile	Ile	Gly	Ser	Gly	Glu	Lys	Asp	Ser	Val	Thr
				85					90					95	

Phe	Asp	Val	Ser	Lys	Leu	Lys	Glu	Gly	Glu	Gln	Tyr	Met	Phe	Phe	Cys
			100					105					110		

Thr	Phe	Pro	Gly	His	Ser	Ala	Leu	Met	Lys	Gly	Thr	Leu	Lys	Leu	Lys
		115					120					125			

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<211> 128

<212> PRT

<213> Artificial Sequence

<220>

<223> chimeric azurin mutant S3S5S4S6

<400> 49

Ala	Glu	Cys	Ser	Val	Asp	Ile	Gln	Gly	Asn	Asp	Gln	Met	Gln	Phe	Asn
1				5					10					15	

Thr	Asn	Ala	Ile	Gln	Val	Asp	Lys	Ser	Cys	Lys	Gln	Phe	Thr	Val	Asn
			20					25					30		

Leu	Ser	His	Pro	Gly	Asn	Leu	Pro	Lys	Asn	Val	Met	Gly	His	Asn	Trp
		35					40					45			

Val Leu Ser Lys Ser Ala Asp Met Gln Pro Ile Ala Thr Asp Gly Met  
50 55 60

Ala Ala Ala Leu Asp Lys Asp Tyr Leu Lys Pro Asp Asp Ser Arg Val  
65 70 75 80

Ile Ala Phe Thr Pro Ile Ile Gly Ser Gly Glu Lys Asp Ser Val Thr  
85 90 95

Phe Asp Val Ser Lys Leu Lys Glu Gly Glu Gln Tyr Met Phe Phe Cys  
100 105 110

Thr Phe Pro Gly His Ser Ala Leu Met Lys Gly Thr Leu Lys Leu Lys  
115 120 125

<210> 50  
<211> 128  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> chimeric azurin mutant S4

<400> 50

Ala Glu Cys Ser Val Asp Ile Gln Gly Asn Asp Gln Met Gln Phe Asn  
1 5 10 15

Thr Asn Ala Ile Gln Val Asp Lys Ser Cys Lys Gln Phe Thr Val Asn  
20 25 30

Leu Ser His Pro Gly Asn Leu Pro Lys Asn Val Met Gly His Asn Trp  
35 40 45

Val Leu Ser Lys Ser Ala Asp Met Gln Met Ile Val Thr Asp Gly Met  
50 55 60

Ala Ser Gly Leu Asp Lys Asp Tyr Leu Lys Pro Asp Asp Ser Arg Val  
65 70 75 80

Ile Ala His Thr Lys Leu Ile Gly Ser Gly Glu Lys Asp Ser Val Thr  
85 90 95

Phe Asp Val Ser Lys Leu Lys Glu Gly Glu Gln Tyr Met Phe Phe Cys

100

105

110

Thr Phe Pro Gly His Ser Ala Leu Met Lys Gly Thr Leu Lys Leu Lys  
 115 120 125

<210> 51  
 <211> 128  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> chimeric azurin mutant S6

<400> 51

Ala Glu Cys Ser Val Asp Ile Gln Gly Asn Asp Gln Met Gln Phe Asn  
 1 5 10 15

Thr Asn Ala Ile Gln Val Asp Lys Ser Cys Lys Gln Phe Thr Val Asn  
 20 25 30

Leu Ser His Pro Gly Asn Leu Pro Lys Asn Val Met Gly His Asn Trp  
 35 40 45

Val Leu Ser Lys Ser Ala Asp Met Gln Pro Ile Ala Thr Asp Gly Met  
 50 55 60

Ala Ser Gly Leu Asp Lys Asp Tyr Leu Lys Pro Asp Asp Ser Arg Val  
 65 70 75 80

Ile Ala His Thr Lys Leu Ile Gly Ser Gly Glu Lys Asp Ser Val Thr  
 85 90 95

Phe Asp Val Ser Lys Leu Lys Glu Gly Glu Gln Tyr Met Phe Phe Cys  
 100 105 110

Thr Phe Pro Gly His Ser Ala Leu Met Lys Gly Thr Leu Lys Leu Lys  
 115 120 125

<210> 52  
 <211> 128  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> chimeric azurin mutant wtS5



<400> 52

Ala Glu Cys Ser Val Asp Ile Gln Gly Asn Asp Gln Met Gln Phe Asn  
1 5 10 15

Thr Asn Ala Ile Thr Val Asp Lys Ser Cys Lys Gln Phe Thr Val Asn  
20 25 30

Leu Ser His Pro Gly Asn Leu Pro Lys Asn Val Met Gly His Asn Trp  
35 40 45

Val Leu Ser Thr Ala Ala Asp Met Gln Gly Val Val Thr Asp Gly Met  
50 55 60

Ala Ala Ala Leu Asp Lys Asp Tyr Leu Lys Pro Asp Asp Ser Arg Val  
65 70 75 80

Ile Ala Phe Thr Pro Ile Ile Gly Ser Gly Glu Lys Asp Ser Val Thr  
85 90 95

Phe Asp Val Ser Lys Leu Lys Glu Gly Glu Gln Tyr Met Phe Phe Cys  
100 105 110

Thr Phe Pro Gly His Ser Ala Leu Met Lys Gly Thr Leu Thr Leu Lys  
115 120 125

<210> 53

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<213> Artificial Sequence

<220>

<223> chimeric azurin mutant wtS5S4S6

<400> 53

Ala Glu Cys Ser Val Asp Ile Gln Gly Asn Asp Gln Met Gln Phe Asn  
1 5 10 15

Thr Asn Ala Ile Thr Val Asp Lys Ser Cys Lys Gln Phe Thr Val Asn  
20 25 30

Leu Ser His Pro Gly Asn Leu Pro Lys Asn Val Met Gly His Asn Trp  
35 40 45

Val Leu Ser Thr Ala Ala Asp Met Gln Pro Ile Ala Thr Asp Gly Met

50

55

60

Ala Ala Ala Leu Asp Lys Asp Tyr Leu Lys Pro Asp Asp Ser Arg Val  
65 70 75 80

Ile Ala Phe Thr Pro Ile Ile Gly Ser Gly Glu Lys Asp Ser Val Thr  
85 90 95

Phe Asp Val Ser Lys Leu Lys Glu Gly Glu Gln Tyr Met Phe Phe Cys  
100 105 110

Thr Phe Pro Gly His Ser Ala Leu Met Lys Gly Thr Leu Thr Leu Lys  
115 120 125